



**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2021-0129; Project Identifier AD-2020-01597-E; Amendment 39-21577; AD 2021-11-15]**

**RIN 2120-AA64**

**Airworthiness Directives; International Aero Engines AG Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for certain International Aero Engines AG (IAE) V2500 model turbofan engines. This AD was prompted by an analysis performed by the manufacturer after an event involving an uncontained failure of a high-pressure turbine (HPT) 1st-stage disk that resulted in high-energy debris penetrating the engine cowling. This AD requires the performance of an ultrasonic inspection (USI) of the HPT 1st-stage disk and HPT 2nd-stage disk and, depending on the results of the inspections, replacement of the HPT 1st-stage disk or HPT 2nd-stage disk. The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** For service information identified in this final rule, contact International Aero Engines AG, 400 Main Street, East Hartford, CT 06118; phone: (800) 565-0140; email: [help24@pw.utc.com](mailto:help24@pw.utc.com); website: <http://fleetcare.pw.utc.com>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the

availability of this material at the FAA, call (781) 238-7759. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0129.

### **Examining the AD Docket**

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0129; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Nicholas Paine, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7742; fax: (781) 238-7199; email: [nicholas.j.paine@faa.gov](mailto:nicholas.j.paine@faa.gov).

### **SUPPLEMENTARY INFORMATION:**

#### **Background**

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain IAE V2522-A5, V2524-A5, V2525-D5, V2527-A5, V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, V2531-E5, and V2533-A5 model turbofan engines. The NPRM published in the *Federal Register* on March 8, 2021 (86 FR 13225). The NPRM was prompted by an event involving an uncontained failure of an HPT 1st-stage disk that resulted in high-energy debris penetrating the engine cowling. On March 18, 2020, an Airbus Model A321-231 airplane, powered by IAE V2533-A5 model turbofan engines, experienced an uncontained HPT 1st-stage disk failure that resulted in an aborted takeoff. The uncontained failure of the HPT 1st-stage disk resulted in high-energy debris penetrating the engine cowling. The FAA published Emergency AD 2020-07-51 on March 21, 2020 (followed by publication in the *Federal Register* on April 13, 2020, as a Final Rule, Request for Comments (85 FR 20402)) and AD 2021-01-03 on January 6, 2021 (86 FR 458), to remove from service HPT 1st-stage and HPT 2nd-stage disks identified as having the highest risk of failure. Based on the root cause analysis performed since that event, the manufacturer identified a population of

HPT 1st-stage disks and HPT 2nd-stage disks that require inspection and possible removal from service. In the NPRM, the FAA proposed to require the performance of a USI of the HPT 1st-stage disk and HPT 2nd-stage disk and, depending on the results of the inspections, replacement of the HPT 1st-stage disk or HPT 2nd-stage disk. The FAA is issuing this AD to address the unsafe condition on these products.

## **Discussion of Final Airworthiness Directive**

### **Comments**

The FAA received comments from three commenters. The commenters were Cathay Pacific Airways (Cathay), IAE, and an individual commenter. One commenter requested clarification on the compliance time for inspection. Another commenter requested clarification regarding additional inspections that are needed when parts are removed for piece part inspections. One commenter requested clarification regarding the definition of a part eligible for installation as well as the installation prohibition. An individual commenter supported the proposal without change. The following presents the comments received on the NPRM and the FAA's response to each comment.

### **Request to Clarify USI Interval for Different Thrust Ratings**

Cathay asked for clarification of the interval for performing the USI for any HPT 1st-stage disk or HPT 2nd-stage disk that has operated in different thrust ratings, such as from 27K to 33K, or 33K to 27K. Cathay reasoned that during the IAE V2500 Customer Council Call in December 2020, IAE used thrust ratings to indicate when to perform the inspections of the HPT 1st-stage disk or HPT 2nd-stage disk.

The FAA reviewed IAE Non-Modification Service Bulletin (NMSB) No. V2500-ENG-72-0713, Revision 1, dated January 26, 2021 (IAE NMSB V2500-ENG-72-0713, Revision 1). This revised NMSB was published after the IAE V2500 Customer Council Call in December 2020. The revised NMSB removed references to thrust ratings in the Compliance section. Therefore, this AD does not distinguish inspection intervals based on thrust ratings.

### **Request to Clarify Piece-Part Opportunity Inspection Requirements**

IAE requested clarification on whether an HPT 1st-stage disk and HPT 2nd-stage disk with fewer than 100 flight cycles (FCs) since the last piece-part fluorescent penetrant

inspection (FPI) need to undergo another FPI if the same parts were removed for the piece-part opportunity USI in accordance with IAE NMSB V2500-ENG-72-0713, Revision 1. IAE reasoned that the V2500 Maintenance Scheduling section of the Airworthiness Limitations Section (ALS) requires an FPI at each piece-part opportunity.

The FAA clarifies that when an HPT 1st-stage disk or an HPT 2nd-stage disk is removed for piece-part inspection, the ALS of the manufacturer's Instructions for Continued Airworthiness may require additional inspections not required by this AD. The FAA refers the commenter to the ALS, which indicates that additional inspections are not required unless the part has more than 100 FCs since the last piece-part opportunity inspection, is damaged, or is the cause for the removal of the engine. Engine removal for the purposes of complying with this AD is not "cause" for engine removal as stated in the ALS. The FAA added a note to paragraph (g)(1) of this AD to clarify piece-part inspection requirements.

#### **Request to Define Part Eligible for Installation**

Cathay requested that the FAA define "part eligible for installation" in this AD.

The FAA agrees and added a definition of a "part eligible for installation" in this AD.

#### **Request to Clarify Prohibition on Installation of Parts**

Cathay asked if there is a prohibition on the installation of parts in this AD.

The FAA notes that if a HPT 1st-stage disk or HPT 2nd-stage disk does not pass the inspection required by paragraphs (g)(1) through (6) of this AD, the HPT 1st-stage disk or 2nd-stage disk, as applicable, must be removed from service. Any HPT 1st-stage disk or 2nd-stage disk that passes the inspection is eligible for installation. As noted in an earlier comment response, the FAA added the definition of a "part eligible for installation" in this AD, which includes this clarification.

#### **Support for the AD**

An individual commenter expressed support for the AD as written.

#### **Conclusion**

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA

is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes and any other changes described previously, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

#### **Related Service Information under 1 CFR Part 51**

The FAA reviewed IAE NMSB No. V2500-ENG-72-0713, Revision 1, dated January 26, 2021. The NMSB identifies the affected HPT 1st-stage disks and HPT 2nd-stage disks on IAE V2522-A5, V2524-A5, V2525-D5, V2527-A5, V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, and V2533-A5 model turbofan engines and specifies procedures for a USI of the HPT 1st-stage disk and HPT 2nd-stage disk.

The FAA also reviewed IAE NMSB No. V2500-E5-72-0015, dated December 15, 2020. The NMSB identifies the affected HPT 1st-stage disks and HPT 2nd-stage disks on IAE V2531-E5 model turbofan engines and specifies procedures for a USI of the HPT 1st-stage disk and HPT 2nd-stage disk.

This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

#### **Costs of Compliance**

The FAA estimates that this AD affects 1,100 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

##### **Estimated costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>	<b>Cost on U.S. operators</b>
USI the HPT 1st-stage disk and HPT 2nd-stage disk	20 work-hours x \$85 per hour = \$1,700	\$0	\$1,700	\$1,870,000

The FAA estimates the following costs to do any necessary replacement that would be required based on the results of the inspection. The agency has no way of determining the number of aircraft that might need this replacement:

### **On-condition costs**

<b>Action</b>	<b>Labor Cost</b>	<b>Parts Cost</b>	<b>Cost per product</b>
Replace the HPT 1st-stage disk or HPT 2nd-stage disk	0 work-hours x \$85 per hour = \$0	\$300,000	\$300,000

The FAA has included all known costs in its cost estimate. According to the manufacturer, however, some of the costs of this AD may be covered under warranty, thereby reducing the cost impact on affected individuals.

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

### **Regulatory Findings**

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

### **The Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

**2021-11-15 International Aero Engines AG:** Amendment 39-21577; Docket No. FAA-2021-0129; Project Identifier AD-2020-01597-E.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

None.

#### **(c) Applicability**

This AD applies to International Aero Engines AG (IAE) V2522-A5, V2524-A5, V2525-D5, V2527-A5, V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, V2531-E5, and V2533-A5 model turbofan engines with an installed:

(1) High-pressure turbine (HPT) 1st-stage disk, part number (P/N) 2A5001, with a serial number (S/N) listed in Appendix A, Table 1, of IAE Non-Modification Service Bulletin (NMSB) No. V2500-ENG-72-0713, Revision 1, dated January 26, 2021 (IAE NMSB V2500-ENG-72-0713, Revision 1) or IAE NMSB No. V2500-E5-72-0015, dated December 15, 2020 (IAE NMSB V2500-E5-72-0015); and/or

(2) HPT 2nd-stage disk, P/N 2A4802, with an S/N listed in Appendix A, Table 2, of IAE NMSB V2500-ENG-72-0713, Revision 1, or IAE NMSB V2500-E5-72-0015.

#### **(d) Subject**

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

**(e) Unsafe Condition**

This AD was prompted by an analysis performed by the manufacturer after an event involving an uncontained failure of a HPT 1st-stage disk that resulted in high-energy debris penetrating the engine cowling. The FAA is issuing this AD to prevent failure of the HPT 1st-stage disk and HPT 2nd-stage disk. The unsafe condition, if not addressed, could result in uncontained HPT disk failure, damage to the engine, damage to the airplane, and loss of the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) Required Actions**

(1) For IAE V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, and V2533-A5 model turbofan engines with an HPT 1st-stage disk, P/N 2A5001, with an S/N listed in Appendix A, Table 1, of IAE NMSB V2500-ENG-72-0713, Revision 1, at the next engine shop visit after the effective date of this AD or before the HPT 1st-stage disk has accumulated 3,200 flight cycles (FCs) since the effective date of this AD, whichever occurs first, perform an ultrasonic inspection (USI) of the HPT 1st-stage disk using the Accomplishment Instructions, paragraph 6, of IAE NMSB V2500-ENG-72-0713, Revision 1.

Note 1 to paragraph (g)(1): The USI required by paragraphs (g)(1) through (6) of this AD requires the HPT 1st-stage disk and HPT 2nd-stage disks to be removed from the engine allowing piece-part opportunity inspections. Per the Airworthiness Limitations Section of the manufacturer's Instructions for Continued Airworthiness (ICAs), the additional inspections are not required unless the part has more than 100 FCs since the last piece-part opportunity inspection, is damaged, or is the cause for the removal of the engine. Engine removal for the purposes of complying with this AD is not "cause" for removal as stated in the ALS.

(2) For IAE V2527E-A5, V2527M-A5, V2528-D5, V2530-A5, and V2533-A5 model turbofan engines with an HPT 2nd-stage disk, P/N 2A4802, with an S/N listed in Appendix A, Table 2, of IAE NMSB V2500-ENG-72-0713, Revision 1, at the next engine shop visit after the effective date of this AD or before the HPT 2nd-stage disk has

accumulated 3,200 FCs since the effective date of this AD, whichever occurs first, perform a USI of the HPT 2nd-stage disk using the Accomplishment Instructions, paragraph 7, of IAE NMSB V2500-ENG-72-0713, Revision 1.

(3) For IAE V2522-A5, V2524-A5, V2525-D5, and V2527-A5 model turbofan engines with an HPT 1st-stage disk, P/N 2A5001, with an S/N listed in Appendix A, Table 1, of IAE NMSB V2500-ENG-72-0713, Revision 1, at the next HPT rotor and stator assembly (HPT module) removal or before the HPT 1st-stage disk has accumulated 6,700 FCs since the effective date of this AD, whichever occurs first, perform a USI of the HPT 1st-stage disk using the Accomplishment Instructions, paragraph 6, of IAE NMSB V2500-ENG-72-0713, Revision 1.

(4) For IAE V2522-A5, V2524-A5, V2525-D5, and V2527-A5 model turbofan engines with an HPT 2nd-stage disk, P/N 2A4802, with an S/N listed in Appendix A, Table 2, of IAE NMSB V2500-ENG-72-0713, Revision 1, at the next HPT module removal or before the HPT 2nd-stage disk has accumulated 6,700 FCs since the effective date of this AD, whichever occurs first, perform a USI of the HPT 2nd-stage disk using the Accomplishment Instructions, paragraph 7, of IAE NMSB V2500-ENG-72-0713, Revision 1.

(5) For IAE V2531-E5 model turbofan engines with an HPT 1st-stage disk, P/N 2A5001, with an S/N listed in Appendix A, Table 1, of IAE NMSB V2500-E5-72-0015, at the next engine shop visit or before the HPT 1st-stage disk has accumulated 3,200 FCs since the effective date of this AD, whichever occurs first, perform a USI of the HPT 1st-stage disk using the Accomplishment Instructions, paragraph 6, of IAE NMSB V2500-E5-72-0015.

(6) For IAE V2531-E5 model turbofan engines with an HPT 2nd-stage disk, P/N 2A4802, with an S/N listed in Appendix A, Table 2, of IAE NMSB V2500-E5-72-0015, at the next engine shop visit or before the HPT 2nd-stage disk has accumulated 3,200 FCs since the effective date of this AD, whichever occurs first, perform a USI of the HPT 2nd-stage disk using the Accomplishment Instructions, paragraph 7, of IAE NMSB V2500-E5-72-0015.

(7) If, during the USI required by paragraphs (g)(1) through (6) of this AD, a HPT 1st-stage disk or HPT 2nd-stage disk does not pass the inspection as specified in the Accomplishment Instructions, paragraph 8., of IAE NMSB V2500-ENG-72-0713, Revision 1, or IAE NMSB V2500-E5-72-0015, as applicable, before further flight, remove the HPT 1st-stage disk or 2nd-stage disk, as applicable, from service and replace with a part eligible for installation.

**(h) Definition**

(1) For the purpose of this AD, an “engine shop visit” is the induction of an engine into the shop for maintenance involving the separation of pairs of major mating engine flanges, H-P, except for the following situations, which do not constitute an engine shop visit.

(i) Separation of engine flanges solely for the purposes of transportation without subsequent engine maintenance.

(ii) Engine removal for the purpose of performing field maintenance activities at a maintenance facility in lieu of performing them on-wing.

(2) For the purpose for this AD, a “part eligible for installation” is:

(i) An HPT 1st-stage disk or HPT 2nd-stage disk listed in Appendix A, Tables 1 and 2, of IAE NMSB V2500-ENG-72-0713, Revision 1, or Appendix A, Tables 1 and 2, of IAE NMSB V2500-E5-72-0015, that passed the USI required by paragraphs (g)(1) through (6) of this AD; or

(ii) An HPT 1st-stage disk or HPT 2nd-stage disk that is not listed in Appendix A, Tables 1 and 2, of IAE NMSB V2500-ENG-72-0713, Revision 1, or Appendix A, Tables 1 and 2, of IAE NMSB V2500-E5-72-0015.

**(i) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in Related Information. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

**(j) Related Information**

For more information about this AD, contact Nicholas Paine, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7742; fax: (781) 238-7199; email: [nicholas.j.paine@faa.gov](mailto:nicholas.j.paine@faa.gov).

**(k) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) International Aero Engines (IAE) Non-Modification Service Bulletin (NMSB) No. V2500-ENG-72-0713, Revision 1, dated January 26, 2021.

(ii) IAE NMSB No. V2500-E5-72-0015, dated December 15, 2020.

(3) For IAE service information identified in this AD, contact International Aero Engines AG, 400 Main Street, East Hartford, CT 06118; phone: (800) 565-0140; email: [help24@pw.utc.com](mailto:help24@pw.utc.com); website: <http://fleetcare.pw.utc.com>.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (781) 238-7759.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on May 19, 2021.

Lance T. Gant, Director,  
Compliance & Airworthiness Division,  
Aircraft Certification Service.

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